2001 Conference on Selective Catalytic Reduction and Non-Catalytic Reduction for NOx Control

Clean Power From Coal

Pittsburgh Marriott City Center
Pittsburgh, Pennsylvania
May 16-18, 2001

Sponsored by:

U.S. Department of Energy
Office of Fossil Energy
National Energy Technology Laboratory

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NETL

Dear Colleague:

Welcome to the 2001 Conference on Selective Catalytic and Non-Catalytic Reduction for NO_x Control. The topic of this Conference is one of the major technical-regulatory-economic issues in the combustion of coal for power generation. Ammonia slip, catalyst deactivation, and ammonia in the fly ash are undesirable results of the use of post-combustion technologies for nitrogen oxides (NO_x) reduction.

Numerous laboratory and pilot plant scale NO_x control technologies are being developed worldwide. *Environmental Protection* Magazine asserts that NO_x reduction at power plants is the final frontier for plant optimization software. Jeffrey Smith, Executive Director of the Institute of Clean Air Companies and a keynote speaker at this Conference, has said that NO_x has become the pollutant of the millennium.

Atmospheric NO_x appears to be responding to control measures. The U.S. Environmental Protection Agency (EPA) noted a 10 percent decrease in atmospheric NO_x over the last 10 years in its annual Air Trends Report in August 2000. The 2000 Progress Report of the United States/ Canada Air Quality Agreement forecasts U.S. NO_x emissions to fall from 23 million metric tons in 1998 to 17 million metric tons by 2010.

Following two important NO_x related regulatory court decisions in 1999 and 2000 that were favorable to the EPA, the Supreme Court in February of this year unanimously upheld the EPA's authority to set (lower) ozone and particulate matter standards (National Ambient Air Quality Standards) without regard to costs. This ruling serves to tighten regulatory authority for NO_x reduction regulations. Further, the Supreme Court in early March upheld the EPA's SIP Call of September 1998, allocating NO_x emission limits to 19 States and the District of Columbia. Thus the 20 jurisdictions have until May 31, 2004 to submit their SIPs. The regulatory driver is still forcing technology to keep up.

The Conference on Selective Catalytic and Non-Catalytic Reduction for NO_x Control remains a major focus in dealing with these challenges, and its value as a technology bellwether should only increase. I invite you to participate fully in the discussions generated during this Conference.

Tom Sarkus

Thomas A. Sarkus
Conference Chair

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AGENDA

WEDNESDAY, MAY 16, 2001 - GRAND BALLROOM

10:00 a.m. **Registration**

1:15 p.m. **Introduction**
Thomas A. Sarkus, Conference Chair
Division Director, Coal Power Products Division
U.S. Department of Energy, National Energy Technology Laboratory

1:30 p.m. **Keynote Address**: "Cutting NOx: Business, Policy and Technology"
Jeffrey C. Smith, Executive Director, *Institute of Clean Air Companies, Inc.*

REGULATORY ISSUES

Moderator: Edward C. Healy, *Southern Company Services*

2:00 p.m. NO_x Reductions: A Regulatory Update
Mary Jo Krolewski, and Kevin Culligan, *U.S. Environmental Protection Agency*

2:30 p.m. Update on NOx Regulations: Markets and Control Technologies
Alex Farrell, *Carnegie Mellon University*

3:00 p.m. Industry Dynamics and NOx Control
David E. Wojick, *PowervisioN*

3:30 p.m. **Break**

COMMERCIAL APPLICATIONS OF SELECTIVE CATALYTIC REDUCTION (SCR)

4:00 p.m. Commissioning Experiences on the SCR Retrofit at Pennsylvania Power and Light's 775 MW Montour Station Unit 2
Tom Robinson, *Babcock Borsig Power, Inc.*, and Roy Glaser, *PP&L Inc.*

4:30 p.m. O&M Considerations in SCR Reactor Design
Darryl Wall, *Southern Company Generation*

5:00 p.m. Process & Equipment Design Considerations for SCR
Thomas Wright, Michael DeLallo, and Roy Sensenig
Parsons Energy & Chemicals Group Inc.

5:30 p.m. **Adjourn**

THURSDAY, MAY 17, 2001 - GRAND BALLROOM

7:00 a.m. **Registration/Continental Breakfast**

Moderator: Thomas J. Feeley III, *U. S. Department of Energy, National Energy Technology Laboratory*

7:30 a.m. Is the European SCR Experience Adequate to Meet the Challenges of U.S. Coals?
Anupam Sanyal, *International Environmental & Energy Consultants, Inc.*
Joseph J. Pircon, *Benetech, Inc.*

8:00 a.m. ENEL Produzione Experience in Designing and Commissioning DeNOx-SCR Systems
M. Cioni, C. LaMarca, and S. Malloggi, *ENEL Produzione - Ricerca*

8:30 a.m. TVA-Paradise Fossil Plant: Acoustic Cleaners vs. Sootblowers
Jake Shelton, *BHA Group, Inc.*, and Joe D. Jiles, *Tennessee Valley Authority*

9:00 a.m. **Break**

THURSDAY, MAY 17, 2001, CONTINUED

SCR CATALYST STUDIES

9:30 a.m.	Recent Experience with SCR Catalyst Regeneration Herwig Maier, and James J. Ferrigan, *Enra, LLC* Jörn Matschke, *EnBW Ingenieure GmbH*
10:00 a.m.	An Evaluation of SCR Catalyst Performance in PRB Applications Keith Harrison, *Southern Company Services, Inc.*
10:30 a.m.	First Year's Operating Experience with SCR on a 600-MW PRB-Fired Boiler Dave Harris, *Black & Veatch* Scot Pritchard, *Cormetech*
11:00 a.m.	Bench- and Pilot-Scale Evaluation of SCR and Other Catalytic Technologies Boris N. Eiteneer, Peter Maly, and Vladimir M. Zamansky *GE Energy and Environmental Research Corporation* Robert A. Gazarov, *State University of Oil and Gas, Moscow, Russia*

INNOVATIVE TECHNOLOGIES FOR NOx CONTROL

11:30 a.m.	Combination of ROFA and ROTAMIX in Unit 6 at the Cape Fear Station Edwin E. Haddad, *Mobotec USA, Inc.*
12:00 Noon	**Lunch (on your own)**

COMMERCIAL APPLICATIONS OF SELECTIVE NON-CATALYTIC REDUCTION (SNCR)

Moderator: Edward K. Levy, *Energy Research Center, Lehigh University*

1:30 p.m.	Application of Fuel Lean Gas Reburn with SNCR on a 198 MW Coal-Fired Utility Boiler David Killen, *Carolina Power & Light Company* John Boyle, and John O'Leary, *Fuel Tech, Inc.*
2:00 p.m.	Design, Installation, and Testing of Aqueous Urea Based SNCR Performance in Conectiv's Indian River Units 3 and 4 M.A. Cremer, *Reaction Engineering International* Mark Sankey, and V. Ciarlante, *Hamon-Research Cottrell, USA* M. Zoccola, *Conectiv*
2:30 p.m.	Design, Installation, and Testing of Rich Reagent Injection in Conectiv's B.L. England Unit 1 Marc A. Cremer, and Bradley R. Adams, *Reaction Engineering International* Venkata N. Bhamidipati, *Conectiv* David O'Connor, *Electric Power Research Institute* Gifford Broderick, *RJM Corporation*
3:00 p.m.	Burner Optimization in Conjunction with SNCR Reduced NOx Emissions Over 70% on Coal-Fired Boilers R. G. Broderick, and Edmund Schindler, *RJM Corporation* Phil Trego, *PECO Energy* Gary St. Laurent, and Nick Milonopoulos, *Public Service of New Hampshire*
3:30 p.m.	**Break**

THURSDAY, MAY 17, 2001, CONTINUED

AMMONIA GENERATION FOR SCR AND SNCR SYSTEMS

4:00 p.m. Startup and Operation of the First U2A™ Urea to Ammonia Conversion System at AES Los Alamitos Station
Herbert Spencer, *EC&C Technologies*
H. James Peters, and Jay DeMartino, *Hamon Research-Cottrell*
Jeffery E. Fisher, *Wahlco*

4:30 p.m. New Conceptual Selective Catalytic Reduction Process Using Urea for NOx Reduction
William H. Sun, *Fuel Tech*

5:00 p.m. **Adjourn**

5:30 p.m.- 7:00 p.m. **Poster Session and Reception - GRAND BALLROOM FOYER**

FRIDAY, MAY 18, 2001 - GRAND BALLROOM

7:00 a.m. **Continental Breakfast**

COMPUTATIONAL FLUID DYNAMICS (CFD) FOR SCR AND SNCR DESIGN

Moderator: John M. Boyle, *Fuel Tech, Inc.*

7:30 a.m. Mixing and Flow Conditioning in Front of a Catalyst Bed for a SCR Process
Arno Signer, *Sulzer Chemtech AG*

8:00 a.m. On the Optimization of SCR System Flue Design
Soung M. Cho, and Joseph Borowsky, *Foster Wheeler Development Corporation*

8:30 a.m. CFD Evaluation of Fuel Lean Gas Reburning (FLGR™) and Selective Non-Catalytic Reduction in Owensboro Municipal Utilities' Elmer Smith Station
David H. Wang, Marc A. Cremer, and Bradley R. Adams, *Reaction Engineering International*
K.D. Frizzell, *Owensboro Municipal Utilities*
G.C. Dusatko, *Sargent & Lundy*

9:00 a.m. **Break**

NON-COAL APPLICATIONS OF SCR

9:30 a.m. Cost and Design Implications of SCR Applied to Reheat Furnaces
Paul D. Debski, *Bricmont Incorporated*

10:00 a.m. High Concentration NOx Removal Using a Multistage Combustor
Daniel M. Battleson, Steven E. Johnson, Steve B. Bryson, John L. Montgomery, and Clarence G. Whitworth, *MSE Technology Applications, Inc.*

AMMONIA REMOVAL FROM FLY ASH

10:30 a.m. Ammonia Removal from Coal Fly Ash by Carbon Burn-Out
Vincent M. Giampa, *Progress Materials, Inc.*

11:00 a.m. Ammonia Removal from Fly Ash Using an Acoustically Enhanced Fluidized Bed
Edward K. Levy, DeShau Huang, and Kenneth B. Lawton
Energy Research Center, Lehigh University

11:30 a.m. Removing Ammonia from Fly Ash
S. Gasiorowski, J. Bittner, and F. Hrach, *Separation Technologies Incorporated*

12:00 Noon **Closing Remarks**
Thomas A. Sarkus, Conference Chair
Division Director, Coal Power Products Division
U.S. Department of Energy, National Energy Technology Laboratory

12:15 p.m. **Close**

POSTER PRESENTATIONS

SCR with Blackmer Compressors
Glenn E. Webb, *Blackmer*

Low Cost NOx Control with SNCR & Reburn with Liquid & Biomass Fuels
Bert Zauderer, *Coal Tech Corp.*

Low Cost, Combined Post-Combustion NOx & SO_2 Control in Fossil Fuel Fired Boilers
Bert Zauderer, *Coal Tech Corp.*

Cost and Performance Models for NOx Control at Coal-Fired Power Plants
Michael B. Berkenpas, and Edward S. Rubin
Center for Energy and Environmental Studies, Carnegie Mellon University
Dennis Smith, and Gerst Gibbon
U.S. Department of Energy, National Energy Technology Laboratory

De-NOx Technologies: Lower-Cost, High-Performance, SNCR Systems
David L. Wojichowski, *De-NOX Technologies*

Lifetime Extension of SCR-DeNOx Catalysts Using SCR-Tech's High Efficiency Ultrasonic Regeneration Process
Peter Sevatius, *ENVICA SCR-Tech GmbH*
Alexander Schluttig, *ENVICA Kat GmbH*

Control of Coal Flow Distributions from Coal Pipe Splitters
Edward K. Levy, Ali Yilmaz, Harun Bilirgen, Jun Wang, and Xuefeng Shi
Energy Research Center, Lehigh University
Presenter: John Sale, *Energy Research Center, Lehigh University*

The Influence of Unburned Carbon on the Filtration Performance of a Ceramic Filter
J-H Choi, J-J Ahn, and S-J Ha, *Dept. of Chem. Eng., Gyeongsang National University*
Y-O Park, *Energy & Envir. Research Dept., Korea Institute of Energy Research*

Preparation of SCR Catalytic Filter Supported on a Filter Candle
J-H Choi, J-J Ahn, and S-J Ha, *Dept. of Chem. Eng., Gyeongsang National University*
Y-O Park, *Energy & Envir. Research Dept., Korea Institute of Energy Research*

Installation and Start-Up of the First Large Scale AOD™ Process on Two 1,300 MW Coal-Fired Mid-West Utility Boilers
Hamilton G. Walker, Jr., and Jeffrey J. Prickel, *Environmental Elements Corporation*

Pin Piles for SCR Foundations
Martin G. Taube, and Seth L. Pearlman, *Nicholson Construction Company*

Pavilion Solution for Optimization and Control of Boilers with SCR Systems
Madhu Ramavajjala, *Pavilion Technologies, Inc.*

Project CONDOR: MultiMedia MultiPollutant Initiative
Mildred Perry, Gerst Gibbon, and Dennis Smith
U.S. Department of Energy, National Energy Technology Laboratory